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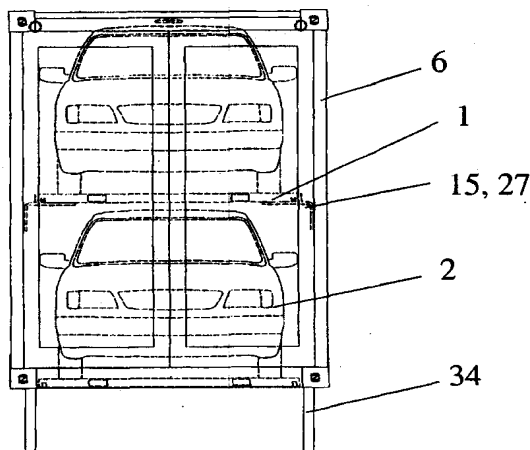
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ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: TRANSPORT CONTAINER AND METHOD FOR TRANSPORTING PALLETED CARGO IN THE TRANSPORT  
CONTAINER



(57) Abstract: The invention relates to the transport container (6), the structure of which is open from the bottom. The transport container (6) can easily be loaded with car transport pallets (1), on which the cars (2) have been fastened. The container solution open from the bottom and the structure of the transport pallets (1) maximise the inner height available in transport containers (6) with standard outer dimensions. The car transport pallets (1) form the bottom structure to the transport container (6) for transport. When other piece goods are transported in the transport container (6), the car transport pallets (1) can be stacked on top of each other to the lower part of the transport container (6) and the supports (15, 27) can be lifted to the upper corners of the transport container (6) so that the space available for the return transport can be maximised.

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Transport container and method for transporting palletized cargo in the transport container.

5 The present invention relates to a transport container, comprising a frame and, attached to the frame, a roof, side walls, a back wall and a front wall, at least one of which consists of doors.

10 The transport containers currently in use have been built of a frame structure mainly carrying the load, and of a roof, floor, side walls, a back wall and doors forming the front wall, all fixedly attached to the frame. The dimensioning of the containers follows the ISO standard so that all containers would be easily transportable with all carrier vehicles and that they could be stacked on top of each other, for example, in container ships or harbours. The standardised dimensions are especially important in train and ship transports, in which the height of the electric wires and the size of the loading space, respectively, place restrictions on the transports. Also devices used for the handling of containers, such as different kinds of forklifts, cranes, and gripping devices, have been designed for containers of specific sizes. For example, the outer width of Eurobox containers is 2500 mm and the inner width 2400 mm. The normal outer width of transport containers is 8', i.e. 2438 mm. The requirement on versatility restricts the outer height of the basic container to 9'6" (approx. 2.90 m). In special cases, containers with a height of 3.10 – 3.20 m can be used on some transport routes. The lengths of standard-sized containers are 20', 40', 45', 49' or 53' (approx. 6.0 m, 12.2 m, 13.7 m, 15.0 m or 16.2 m).

25 In recent years, also an open, collapsible, twin-deck steel support for transporting cars and following the container dimensions has been introduced. The structure of the supports makes it possible to stack five collapsible supports on top of each other inside a container when they are not used for transporting cars. When using the above solution, empty collapsible frameworks have to be transported back to the car factory without it being able to take financial advantage in the form of other cargo to be transported to the return direction. A further drawback is that the cars become exposed to weather, vandalism, transport damages, etc. as the cars are not surrounded by the protective outer casing of a normal transport container.

30 Piece goods generally placed on pallets are transported in standard containers. The use of transport containers also for transporting cars is extensively increasing. This has created the need to develop a functional, simple system for transporting cars in containers and for loading them into containers. Several different solutions for load-

ing cars into containers have been used when transporting cars in enclosed-type standard transport containers. Various kinds of frameworks have been very popular, to which cars have been fastened outside the container, as is disclosed, for example, in the publications US 6 010 285 and US 5 040 938. After the framework has been  
5 filled, it is pushed inside the container with the cars. Cars can be fastened to the framework to a horizontal or slightly inclined position for maximising the use of space in the transport container. Another reason for placing the cars to an inclined position is the fact that, for example, two big family cars together with the transport framework cannot be fitted horizontally and superimposed inside a container of  
10 standard size in the vertical direction.

The state-of-the-art solutions, in which frameworks to be pushed inside the container or equipment fixedly installed into the container, do not make it possible to efficiently use the container for some other purpose besides transporting cars. Even if the framework could be collapsible in some way, it still takes a considerable  
15 amount of space inside the container and prevents the container from being used for the efficient transport of cargo. Most of the solutions according to the state of the art are not even collapsible so that it is not possible to use the container for any other purpose besides transporting cars. It is very common that, on some routes, cars are only transported to one direction mainly, in which case the efficient utilisation of the  
20 empty container to transport some other piece goods brings a considerable financial benefit.

The object of the invention is to reduce the drawbacks of the above solutions and to provide a transport container with which the use of space, on the one hand, and the easiness of loading and unloading, on the other hand, are optimised.

25 With the solution according to the invention, it is possible to make the use of a transport container of standard outer dimensions more effective so that two big family cars can be transported superimposed, without increasing the outer dimensions of the container, both cars being in horizontal position. The largest transport container of standard dimensions can take 6 – 8 cars. A further advantage is that it is not necessary to fasten and release the cars from the transport frameworks in every place.  
30 As the car has once been fastened to the car transport pallet with reliable fastening methods, for example, in the factory, it is only released from it at the other end of the car transport chain near the final customer. This method saves time, and man-hours are not unnecessarily tied up to the handling of cars, and the risk of damage is  
35 considerably reduced. Also the protection of cars made in the factory need not be done as extensively as before, thus reducing the costs. All the above aspects bring

financial benefit when comparing the solution of the invention with previous state-of-the-art solutions.

5 With the transport container of the invention it is possible to transport the same voluminous amount of other products to the return direction as with the present common transport containers, and to still bring the empty car transport pallets back to the starting point to be used again. Thus, the uneconomic transport of the container as empty, with only the transport framework inside, is avoided.

10 The equipment of the invention is characterised in what is disclosed in the characterising part of the independent claim. The method of the invention is characterised in what is disclosed in the characterising part of the independent claim concerning the method. The dependent claims disclose other advantageous embodiments of the invention.

The invention is next described in more detail, referring to the enclosed drawings, in which

15 Figure 1 presents a car transport pallet with a car fastened on it,

Figure 2 presents a transport container according to the invention open from the bottom as a whole,

20 Figure 3 presents a detachable transverse locking beam, which is installed to the lower edge of the front part of the container for the transport to make the structure more rigid,

Figure 4 presents the loading of the transport container of the present invention with cars, using a forklift,

Figure 5 presents an advantageous embodiment of the supports to be fastened to the side walls of the transport container,

25 Figure 6 presents an advantageous embodiment for locking the car transport pallet in place for the transport of the cars,

Figure 7 presents the positioning of the car transport pallets when other cargo besides cars is transported in the transport container,

30 Figure 8 presents an advantageous embodiment of the equipment for lifting the supports to the upper corners of the transport container,

Figure 9 presents a second advantageous embodiment of the supports on which the upper car transport pallets rest,

Figure 10 presents an advantageous embodiment for locking the car transport pallets in place for the return transport,

- 5 Figure 11 presents an advantageous embodiment of the foldable legs of the transport container, and

Figure 12 is a front view of the transport container to which cars fastened to the car transport pallets have been loaded in two layers.

- 10 Figure 1 presents the car transport pallet 1, with the car 2 fastened on it. The fastening mechanism or equipment has not been included in Figure 1. Any known technique can be used for fastening the car 2 immobile to its support. Such preferable ways are, for example, locking the wheels to the support by chains or lines. The car transport pallet 1 preferably has a thickness of approximately 40 – 80 mm. Its one side, but preferably at least two adjacent sides, is provided with at least two open-  
15 ings 3 for transferring the pallet 1 with a forklift truck. The car transport pallet 1 has recesses 4 at the place of the tyres 5 of the car 2 so that it is possible to utilise the inner height of the standard transport container to the maximum extent. The car transport pallet 1 can also deviate from the solution shown in Figure 1 and represent some other known technique.

- 20 Figure 2 presents the transport container 6 of the invention, open from the bottom and with the doors 7 open, seen obliquely from above. The upper and lower edges of the doors 7 comprise protruding and retractable locking pins 8 for locking the doors in place as the transport container 6 is closed. The purpose of the locking pins 8 is for their part to reinforce the structure of the transport container 6 together with the  
25 doors 7. The fastening of the doors 7 can also be performed by a pin locking of a bank vault type, with pins and counter holes so that the movement of the doors in relation to each other and the container 6 can be prevented in a more efficient way. With the help of the locking of the above mentioned type it is possible to make the doors 7 to receive more torsion than with a normal locking, which is disclosed in  
30 Figure 2. The basic structure of the transport container 6 is similar to that of a standard transport container. Substantial differences compared with the state-of-the-art containers are that the container does not have a fixed bottom structure or a fixedly fastened beam in the lower edge of the front part of the transport container 6.

Figure 3 presents the beam 9, which is detachably fastened to the lower edge of the front part of the transport container 6. The beam 9 can be fastened according to the arrow 10 so that the shaped ends 11 of the beam lock into the counter pieces 12 in the frame structure of the transport container. Here is shown only one advantageous embodiment for the installation of the detachable and lockable beam 9. Also other kinds of solutions are possible. Such advantageous embodiments are, for example, beam solutions with hinges in the one end so that the beam 9 can be moved on hinges either in the vertical direction or lateral direction away from the front of the device used for loading or unloading. It is essential that, when required, the beam 9 can be totally detached or moved on the hinges in the other end to the side from the front edge of the transport container 6 for loading and unloading and locked back in place for transport in order to improve the rigidity of the transport container. It is possible to install respective transverse beams 9 to the floor plane also between the car transport pallets 1 in the middle part of the transport container 6 to increase the rigidity of the transport container. For increasing the torsional rigidity of the transport container 6, when required, also a method or device of some known technique can be used, such as wires/chains with rigging screw tighteners connecting the cross corners of the transport container, or a fixed lattice structure.

In Figure 4, there is shown the loading of the transport container 6, using the forklift application according to the figure for the loading. The loading and unloading can also be carried out by using a forklift truck, which lifts the car transport pallet 1 with cars 2 through the openings 3 in the car transport pallet into the transport container 6. The inner surface of the side walls 14 of the transport container 6 are provided with supports 15, onto which the car transport pallet 1 with cars 2 is lowered. The car transport pallet 1 is fastened and locked in place either automatically or manually. Both the fastening of the supports 15 to the side walls 14 and the locking of the car transport pallet 1 in place is performed by using some known technique. The car transport pallets 1 preferably cover entirely the open bottom, but it is also possible that openings will remain between the pallets, which can be left unfilled or which can be filled with additional pieces/transverse beams.

For example, the solution according to Figure 5 can be used for fastening the supports 15 to the side walls 14, and the solution according to Figure 6 can be used for locking the car transport pallets 1. The fastening points for the supports 15 in Figure 5 can be varied according to the height of the cars 2 to be loaded so that the height of the transport container 6 can be efficiently utilised. The supports 15 have shoulders 16 extending in the direction of the longitudinal axis of the transport container

6, receiving the grooves 17 in the bottom of the car transport pallet 1. The shoulders 16 and grooves 17 prevent the lateral movement of the car transport pallets 1 during transport.

5 In Figure 6, the locking part 21 has been moved transversely in relation to the longitudinal axis of the transport container 6 against the counter piece 22 to lock the car transport pallet in place by rotating the cogwheel 23 clockwise with the help of the crank (not shown in Figures). Respectively, the opening is performed by rotating the cogwheel 23 counter-clockwise.

10 The lower layer of car transport pallets 1 is supported to the shoulders 16 of the counter pieces 19 fastened to the longitudinal side beams 18 of the transport container 6 so that the groove 17 of the car transport pallet 1 is wedged to the said shoulders as the car transport pallet is in place, according to Figure 7. In Figure 7, there is shown one advantageous alternative for locating the counter pieces 19 to support the lower car transport pallets 1 so that they form the bottom structure for the transport container 6. In the arrangement according to Figure 7, the car transport  
15 pallets 1 have been stacked on top of each other as the bottom structure for the transport container 6, and other cargo can be transported in the container on the pallet 20. According to Figure 7, the pallet 20 can be supported either directly to the longitudinal beams 18 of the transport container 6 or, if a narrower pallet 20 is used,  
20 the pallet 20 rests directly on the car transport pallets 1. The fastening of the pallet 20 to the transport container 6 is carried out by using a known technique.

As is shown in Figure 8, the supports 15 fastened to the side walls 14 of the transport container 6 can be lifted to the upper corners of the container, when other piece goods are transported in the container and when one wishes to maximise the volume  
25 available. Any known technique can be used for lifting the supports 15. In the method in Figure 8, the supports 15 are first manually detached from the side walls 14, then the handle 25 in the roof 24 in the front part of the transport container 6 is pulled so that the supports are lifted to the upper corners of the container with the help of the wires 26.

30 According to Figure 9, uniform consoles 27 can be used as supports for the car transport pallets 1 in the side walls of the transport container 6, the consoles extending from the vicinity of the back wall 28 of the transport container near the doors 7 of the transport container. In this case, the consoles 27 can preferably be lifted to the upper corners of the transport container 6 along the guide rails 29 installed to the  
35 side walls 14 of the container, for example, by using the similar equipment as in

Figure 8. The consoles 27 also include means similar to the supports 15 for preventing the movement of the car transport pallets during transport.

Figure 10 shows the location of the car transport pallets 1 as the transport container 6 is used for transporting other piece goods, and their locking in place. In this case, when transporting cars 2, a second car transport pallet 1 fastened to the side walls 14 of the transport container 6 has been lowered on the lower car transport pallet 1. The car transport pallets 1 are locked in place by using some known technique, for example, the locking piece 30 to be installed between the pallets and the longitudinal beam 18 of the transport container 6. The shoulder 31 in the beam 18 prevents the locking piece 30 from moving upwards, and the shoulder 32 in the upper edge of the locking piece respectively prevents the car transport pallet 1 from moving in the vertical direction. Lateral movement can be advantageously controlled by rubber pieces 33 in the locking piece 30, the pieces 33 pressing against the car transport pallet 1 as the locking piece is pushed in place. The installation of the locking pieces 30 is preferably performed manually. For preventing the car transport pallets 1 from moving, also some other known method or device can be used.

Figures 11a and 11b present one advantageous solution of the legs 34 of the transport container 6. In Figure 11a, the leg 34 and the transverse support 35 have been placed inside the beam 18. The foldable legs 34 and their transverse supports 35 can be turned out from the interior of the beam 18 and locked together according to Figure 11b. Because of the legs 34, the transport container 6 can also be used in the RORO system. As the legs 34 and the supports 35 are turned inside the beam 18, the transport container 6 is again like a normal transport container, in which case they can be stacked on top of each other. In a second advantageous embodiment the transport container 6 can be provided with longer turning legs 34, which are positioned outside the casing of the transport container so that the platform of the truck can be driven directly under the transport container. In a special version the transport container can have fixed support legs, in which case it is permanently a transport unit in accordance with the RORO technique.

Figure 12 still presents the transport container 6 standing on legs 34 and loaded with cars 2, seen from the front.

Only one advantageous embodiment of the transport container according to the present invention is disclosed above. However, it is obvious for one skilled in the art that the solution according to the invention can vary within the scope of protection disclosed in the patent claims. Nevertheless, it is essential that the transport con-



tainer is open from the bottom so that it is possible to load/unload cars directly to/from the container, using a forklift or a similar device, and the structure of the transport pallets, maximising the inner height available , makes it possible to also use the transport container for efficient transport of other cargo in return transport.

## Claims

1. Transport container (6), which comprises the frame and, attached to the frame, the roof (24), the side walls (14), the back wall (28) and the front wall, at least the back wall or the front wall consisting of the doors (7), **characterised** in that the bottom of the transport container (6) is formed of one or several pallets (1), used for transporting goods and to be locked in place for transport and detached for unloading.
2. Transport container (6) according to claim 1, **characterised** in that the transport container (6) comprises at least one transverse beam (9), which is fully detachable or which can be turned on hinges from the other end and locked to be placed to the floor plane to increase the rigidity of the transport container (6).
3. Transport container (6) according to claim 2, **characterised** in that the side walls (14) of the transport container (6) include transferable and/or detachable uniform or partial supports (27, 15) for loading the pallets (1) to two or several layers.
4. Transport container (6) according to claim 3, **characterised** in that the transport container (6) comprises locking means (21, 22, 23, 30, 31, 32, 33) for locking the pallets (1) in place for transport.
5. Transport container (6) according to claim 4, **characterised** in that the transport container (6) includes legs (34) that can be folded inside the longitudinal beam (18) and their supports (35).
6. Transport container (6) according to claim 5, **characterised** in that the supports (15, 27) and the counter pieces (19) attached to the frame beams (18) extending in the direction of the longitudinal axis include shoulders (16) extending in the direction of the longitudinal axis of the transport container (6), and that the bottom of the pallets (1) is provided with two longitudinal grooves (17), to which the shoulders (16) of the supports (15, 27) can be fitted for preventing the transverse movement of the pallets (1).
7. Car transport pallet (1) for the transport container (6) according to claim 6, **characterised** in that at least one side of the car transport pallet (1) is provided with at least two openings (3) for moving the car transport pallet (1) with a forklift truck.
8. Car transport pallet (1) according to claim 7, **characterised** in that the car transport pallet (1) has recesses (4) for the tyres (5) of the car (2).

9. Method for transporting palleted cargo in the transport container (6), **characterised** in that cargo (2) fastened on the pallets (1) on the supports (15, 27, 19) are loaded in one or several layers to the transport container (6) open from the bottom so that the lowest pallet layer on the supports (19) forms the bottom for the transport container (6).
10. Method according to claim 9, **characterised** in that the beam (9) in the lower edge of the front part of the transport container (6) is detached for loading and unloading and fastened and locked in place for transport.
11. Method according to claim 10, **characterised** in that the supports (15, 27) fastened to the side walls (14) of the transport container (6) are detached from the side walls (14) and lifted to the upper corners of the transport container (6) for maximising the cargo space when transporting other cargo besides cars (2).
12. Method according to claim 11, **characterised** in that the car transport pallets (1) are locked in place using the means (21, 22, 23, 30, 31, 32, 33) when transporting both cars (2) and other cargo.

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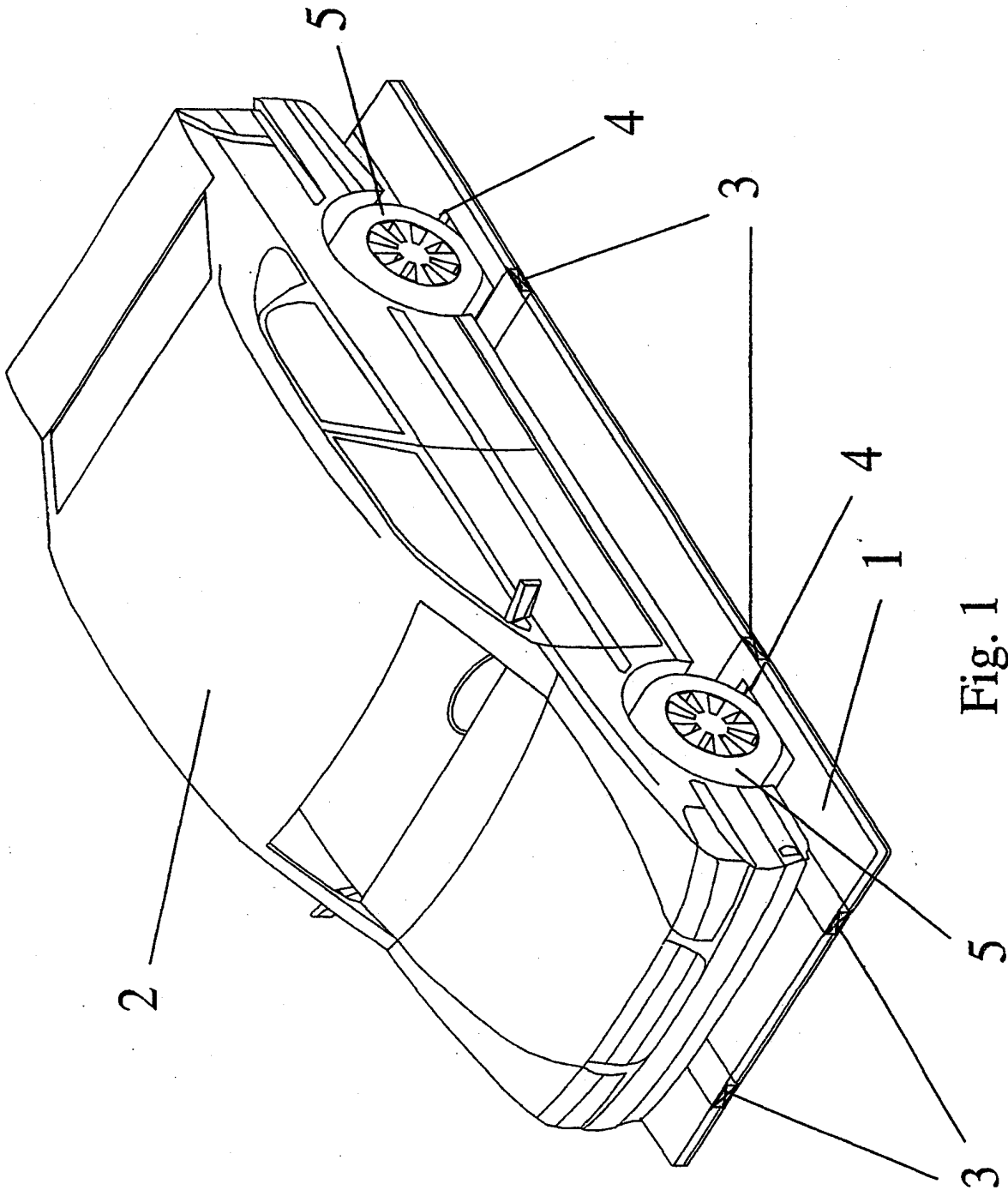


Fig. 1

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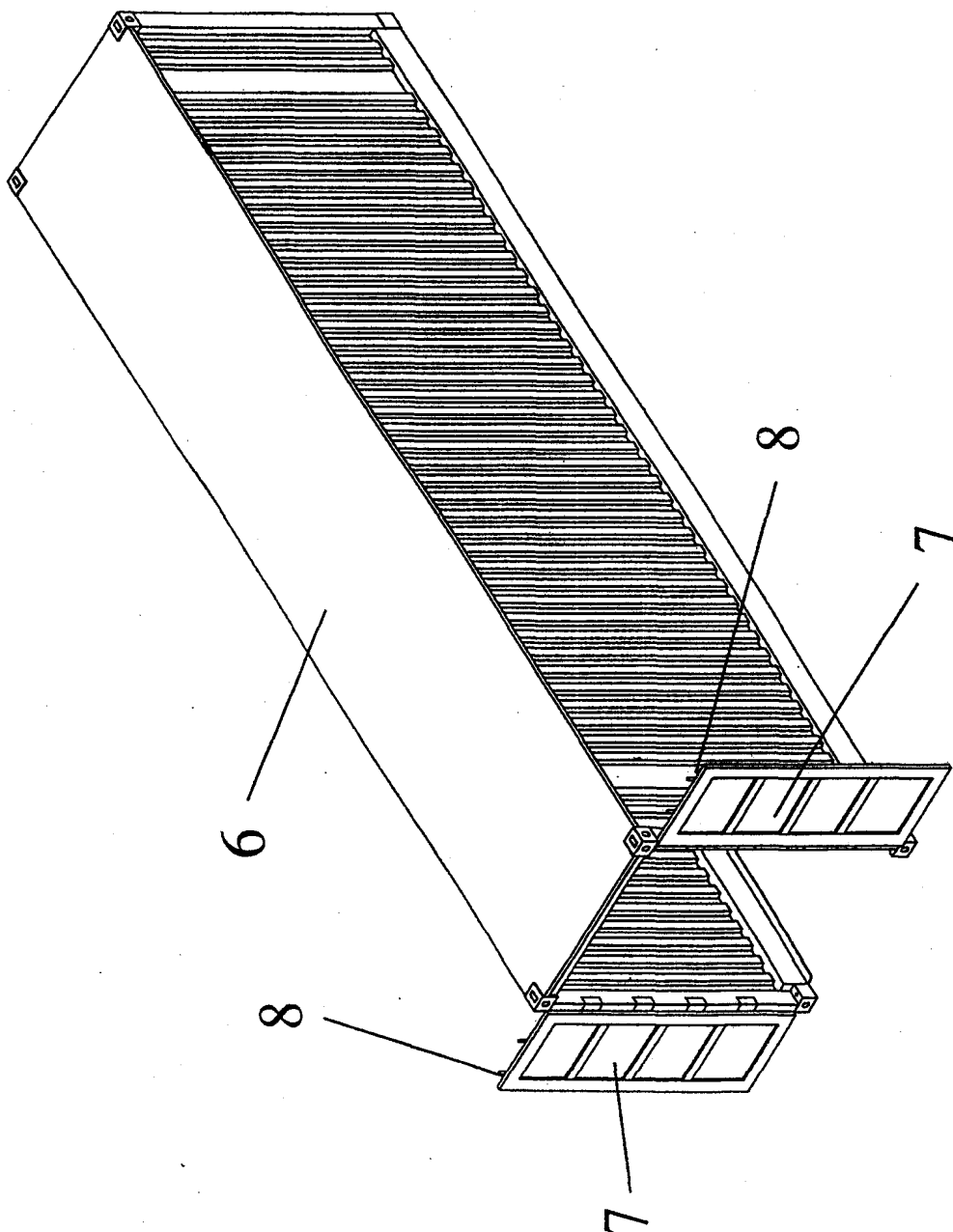


Fig. 2

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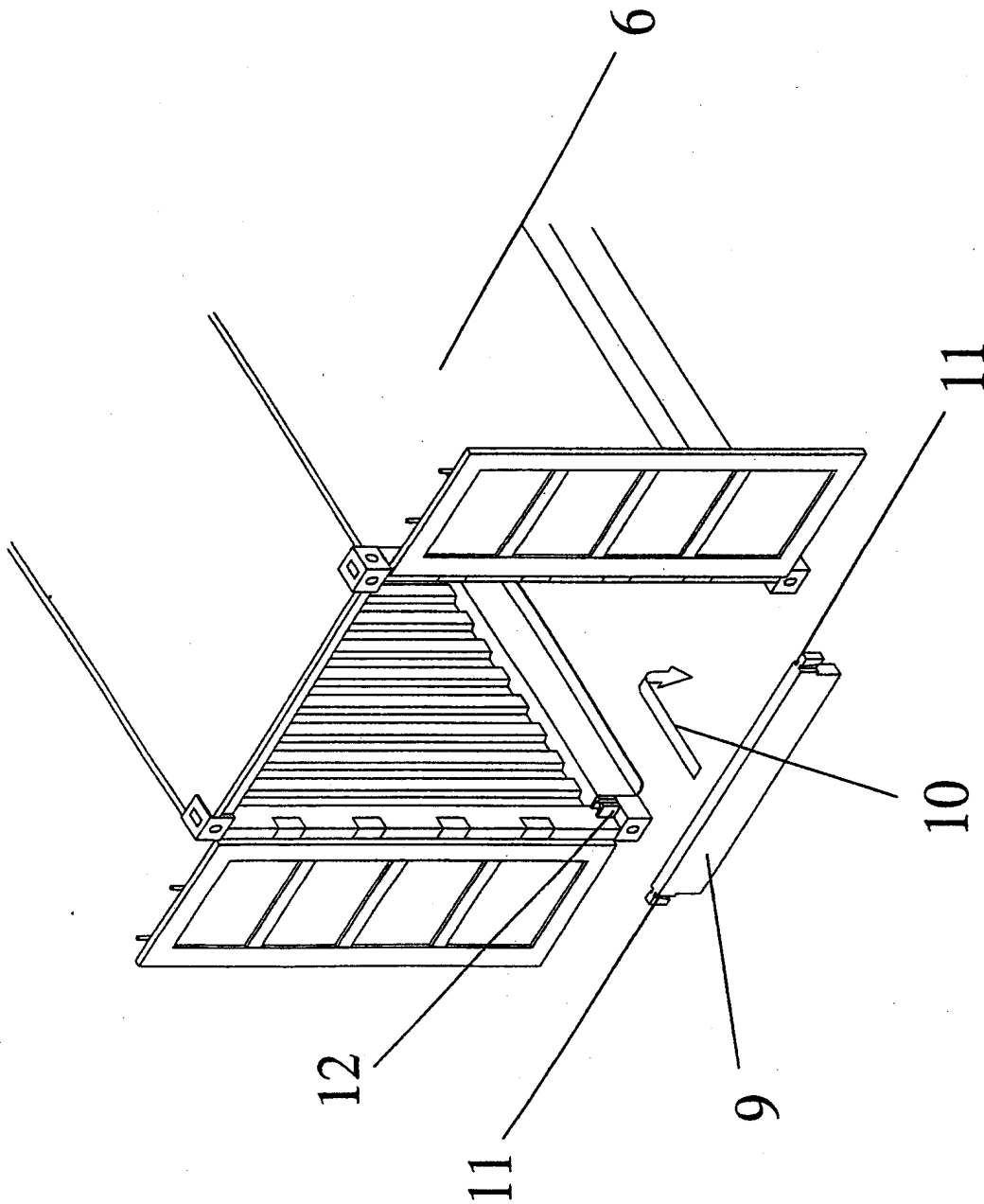


Fig. 3

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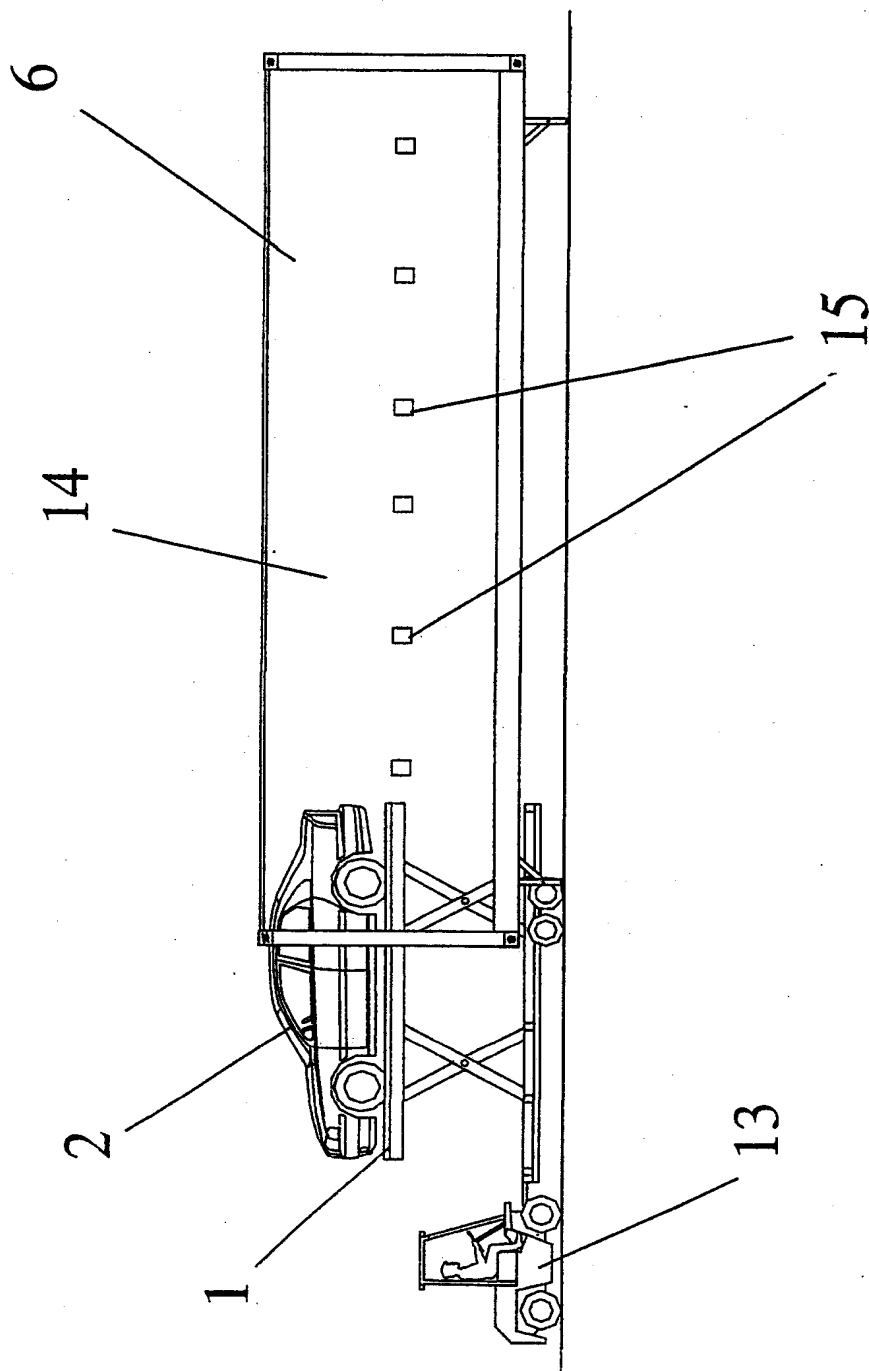


Fig. 4

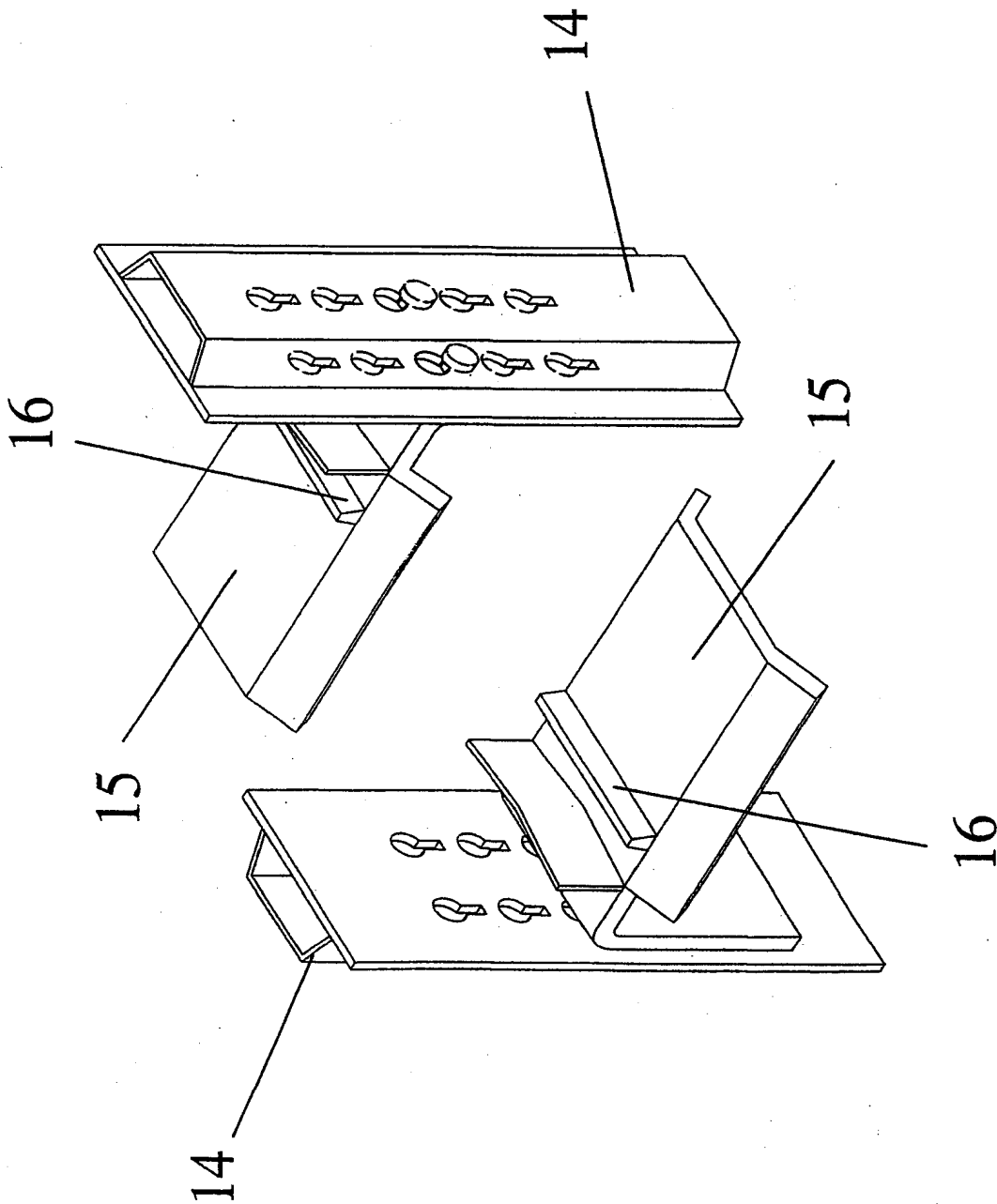


Fig. 5



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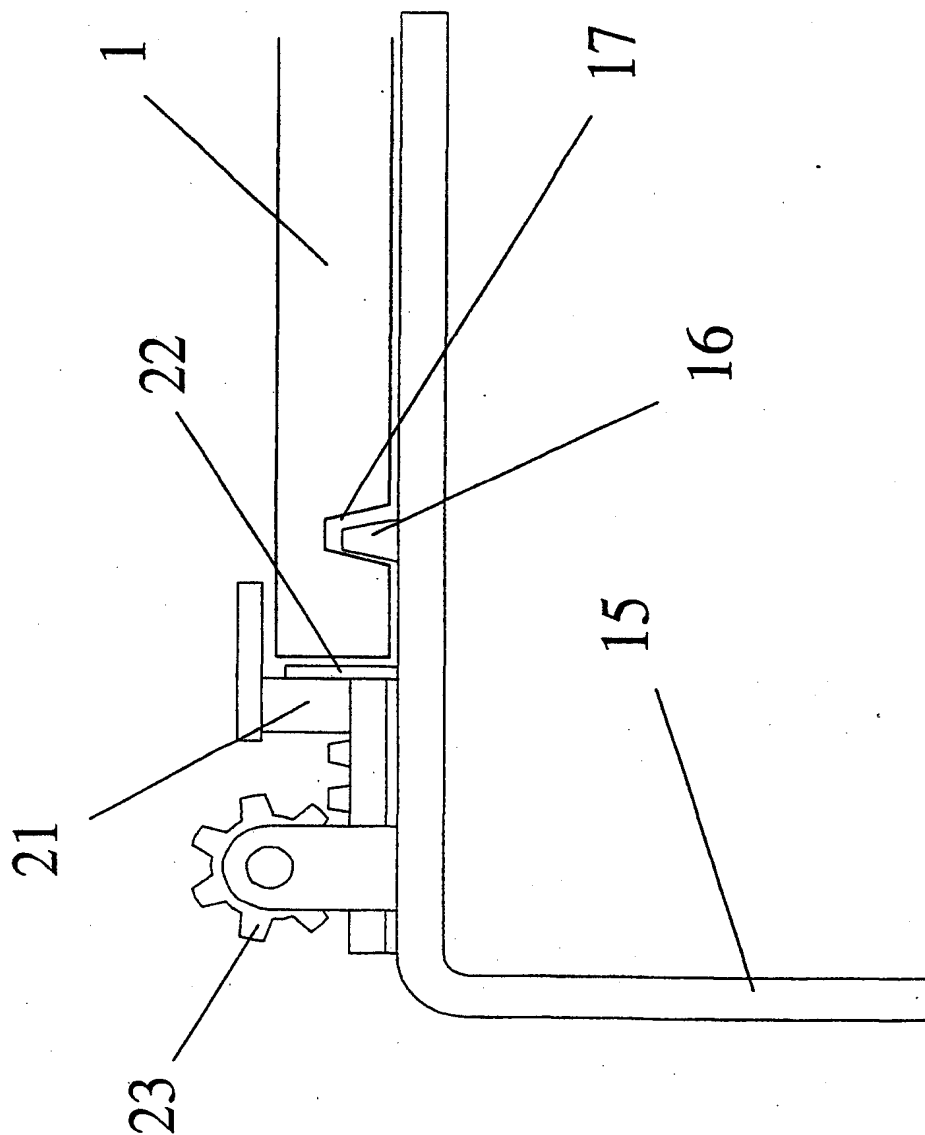


Fig. 6

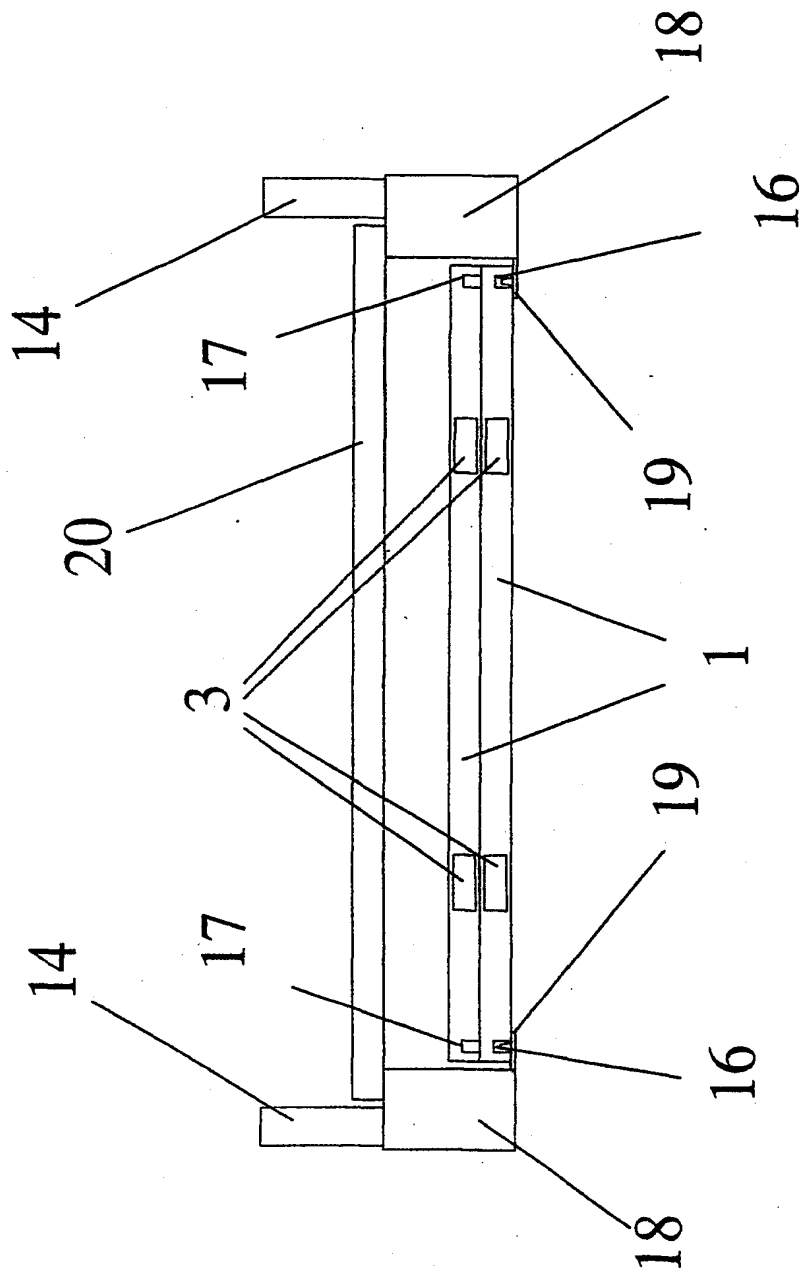
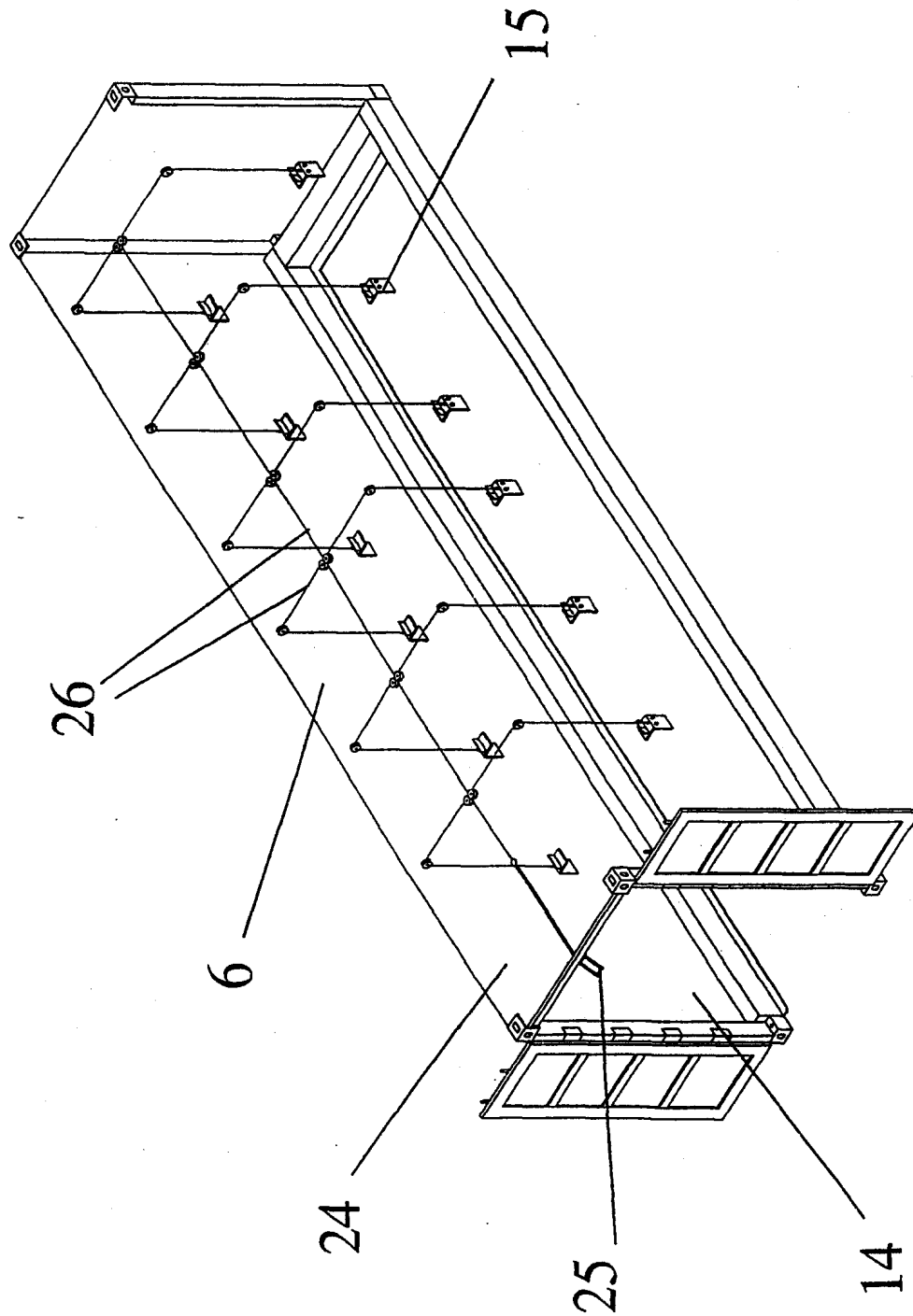


Fig. 7



Fi. 8

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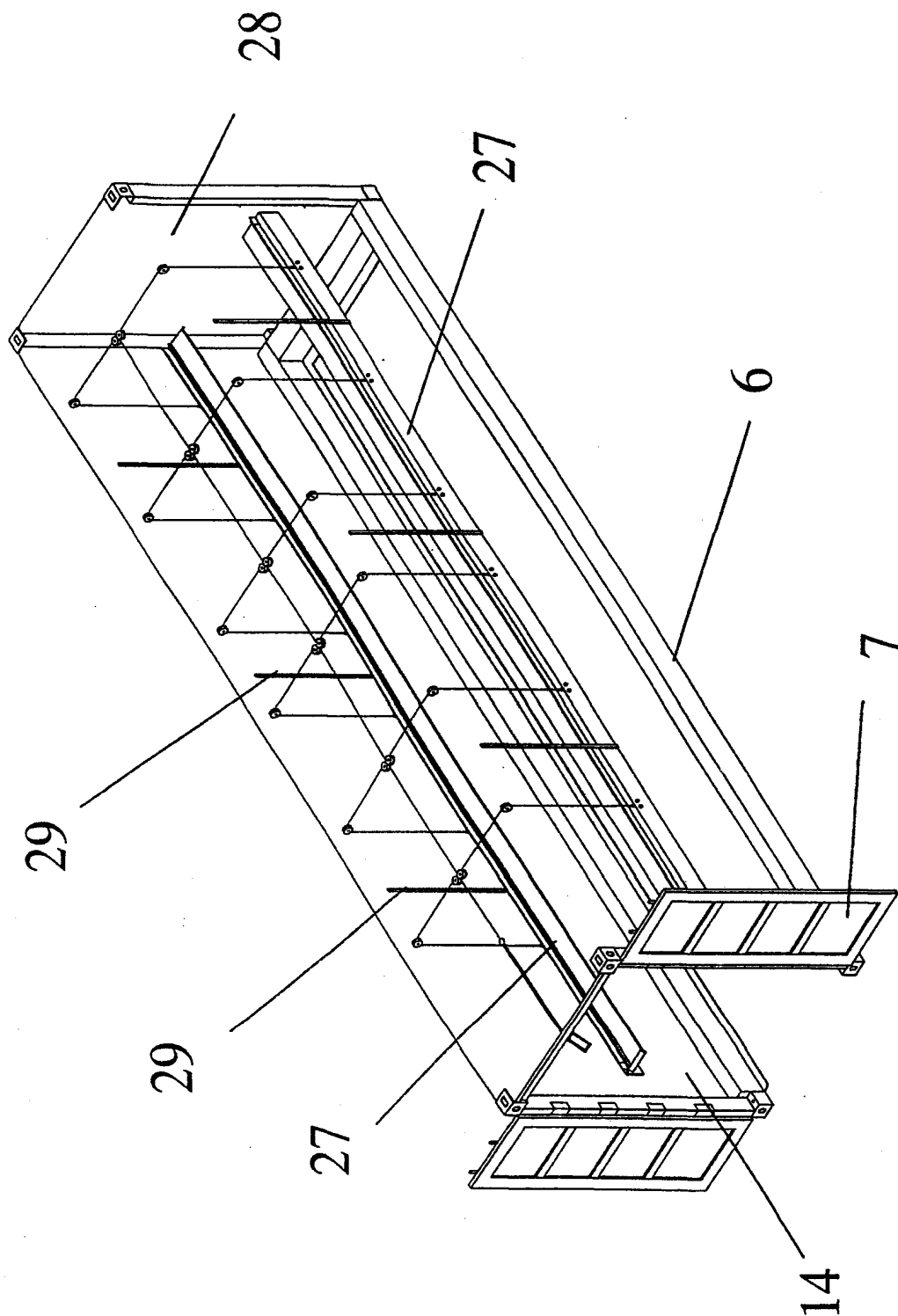


Fig. 9

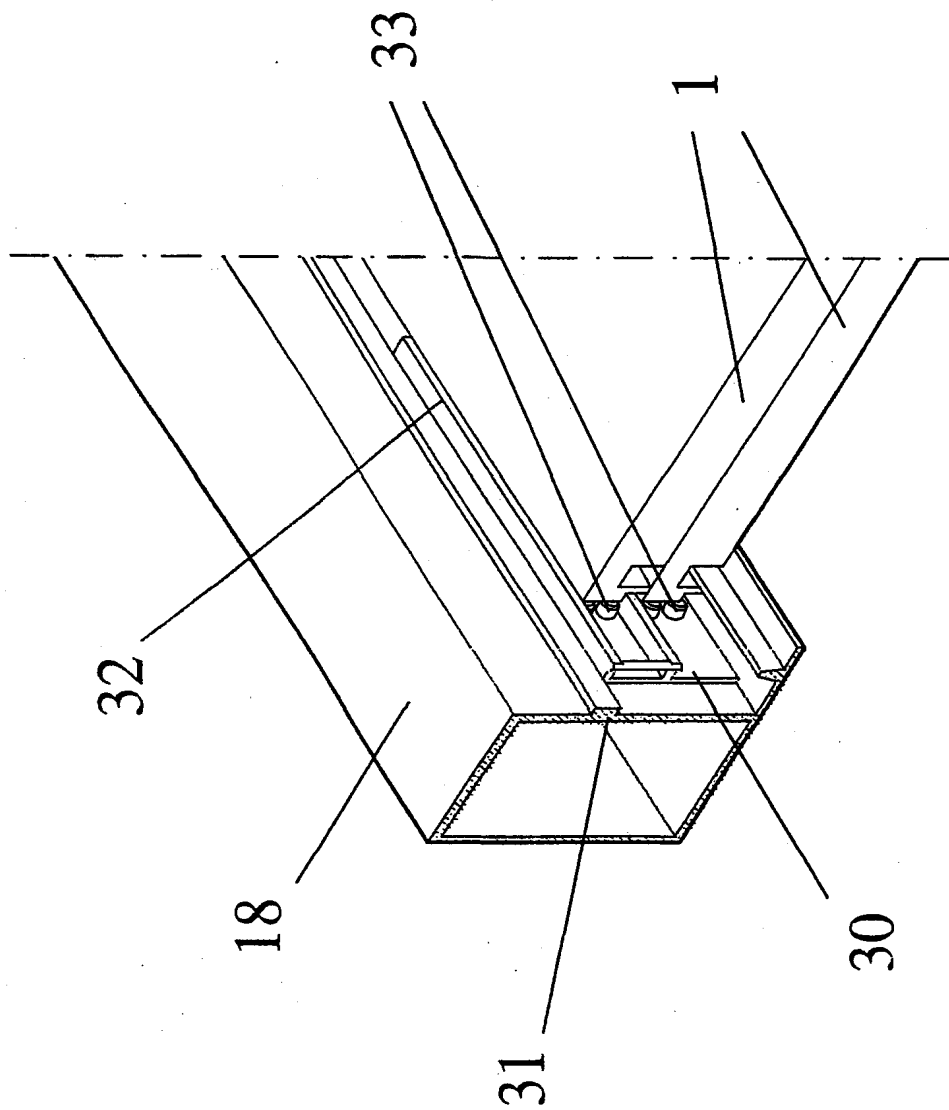


Fig. 10

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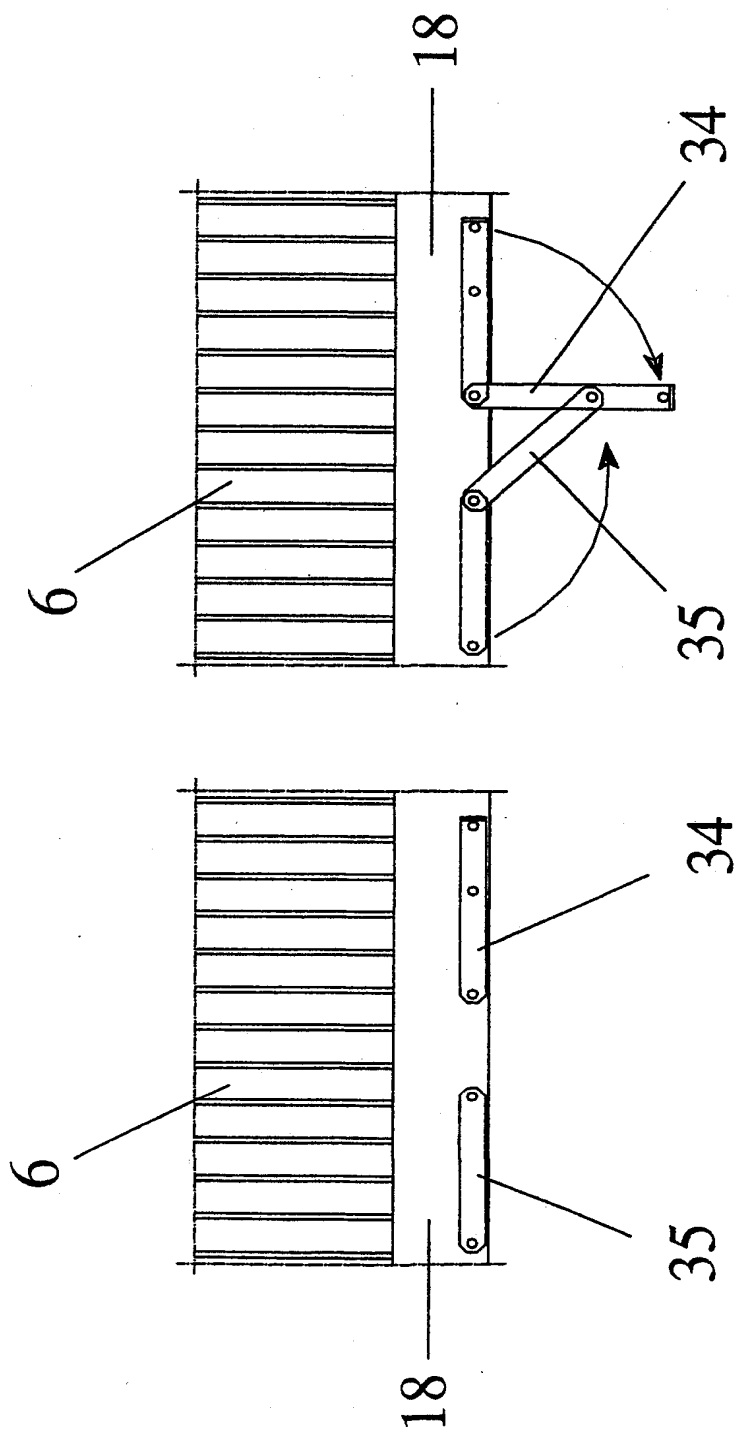


Fig. 11b

Fig. 11a

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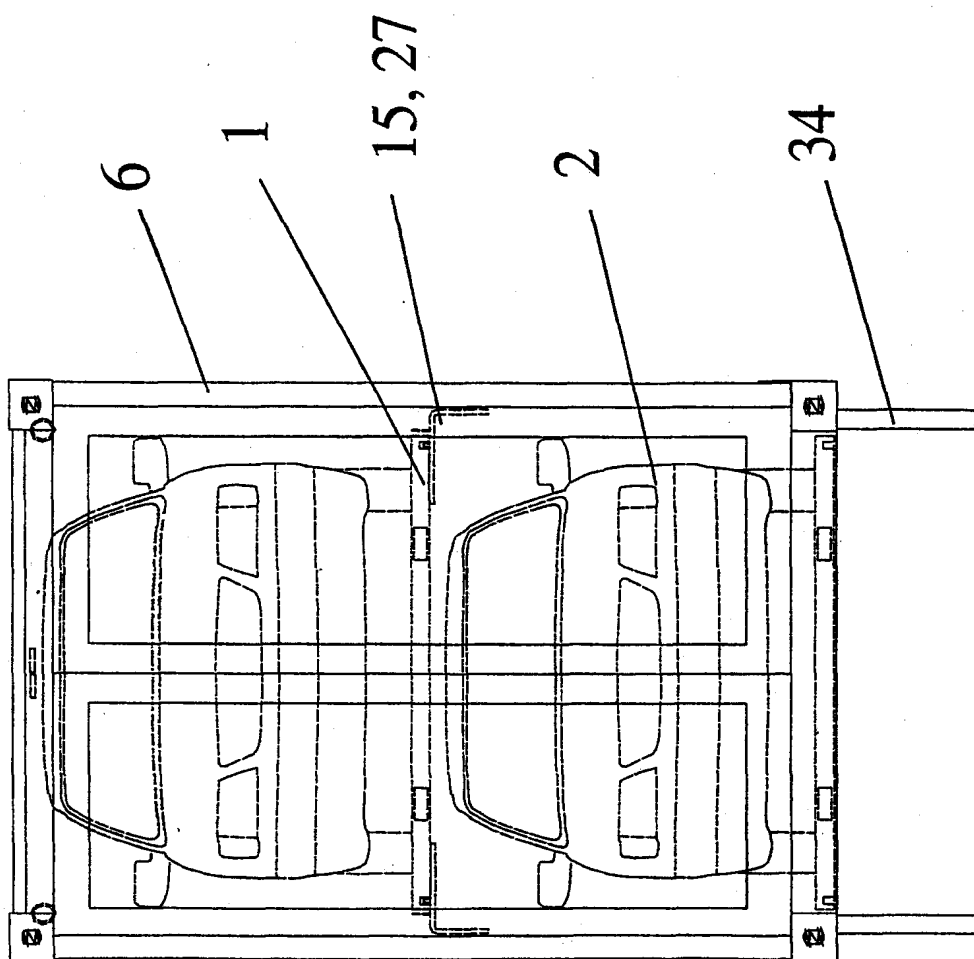


Fig. 12

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00238

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65D 88/12, B60P 3/077

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60P, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	--	9
Y	US 4759668 A (STUART A. LARSEN ET AL), 26 July 1988 (26.07.88), figures 1,3, abstract	9
A	--	1-8,10-12
P,X	WO 0172593 A1 (PERMAR OY), 4 October 2001 (04.10.01), figures 2b,3c, abstract	7,8
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

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International application No.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

10/06/02

International application No.

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